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1 UNITED STATES PATENT AND TRADEMARK OFFICE

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4 BEFORE THE BOARD OF PATENT APPEALS
5 AND INTERFERENCES
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8 *Ex parte* DAVID M. BAGGETT
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11 Appeal 2007-2648
12 Application 09/877,159
13 Technology Center 3600
14

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16 Decided: March 10, 2008
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19 Before HUBERT C. LORIN, ANTON W. FETTING, and
20 JOSEPH A. FISCHETTI, *Administrative Patent Judges*.
21 FETTING, *Administrative Patent Judge*.

22 DECISION ON APPEAL

23 STATEMENT OF CASE

24 David M. Baggett (Appellant) seeks review under 35 U.S.C. § 134 of
25 a final rejection of claims 1-46 and 52-55, the only claims pending in the
26 application on appeal.

1 We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b)
2 (2002).

3 We AFFIRM-IN-PART and ENTER A NEW GROUND UNDER 37
4 C.F.R. § 41.50(b).

5 The Appellant invented a method of producing constructed fares by
6 adding to a published fare an amount, known in the art as an arbitrary, for
7 travel between an interior city and a gateway city. This is done by
8 determining interior cities that appear with gateway cities in arbitraries for
9 an airline, searching for gateway cities corresponding to the determined
10 interior cities appearing in the arbitraries and applying an arbitrary
11 corresponding to one of the interior cities to a published fare involving one
12 of the gateway cities to produce the constructed fare (Specification 3:2-11).

13 An understanding of the invention can be derived from a reading of
14 exemplary claims 1 and 2, which are reproduced below [bracketed matter
15 and some paragraphing added].

16 1. A method of producing a constructed fare that includes an
17 arbitrary added to a published fare, said method executed in a
18 computer system having memory and a persistent storage
19 device, the method comprising:

20 [1] preprocessing by:

21 determining interior cities that appear with gateway cities
22 in arbitraries for an airline,

23 the arbitraries being

24 published amounts and

25 an order [sic, ordered] set of two cities

26 that extend published fares

1 that include an amount for travel between
2 two cities to provide a bi-directional market;
3 and

4 [2] searching a database having published fares
5 for gateway cities corresponding to the determined
6 interior cities appearing in the arbitraries; and

7 [3] producing the constructed fare, by:

8 [a] applying

9 an arbitrary corresponding to one of the interior
10 cities

11 to a published fare involving one of the gateway
12 cities

13 that corresponds to the determined interior
14 cities appearing in the arbitraries

15 to produce a constructed fare; and

16 [b] storing the constructed fare in memory or the
17 persistent storage device of the computer system

18 for use in planning, faring and/or pricing.

19 2. The method of claim 1 wherein determining interior cities
20 comprises:

21 accessing a hash table

22 indexed by an airline, interior-city pair

23 to return a list of gateway cities

24 for which an airline has arbitraries that specify the
25 interior city.

26 This appeal arises from the Examiner's Final Rejection, mailed
27 October 11, 2005. The Appellant filed an Appeal Brief in support of the
28 appeal on August 2, 2006. An Examiner's Answer to the Appeal Brief was
29 mailed on December 7, 2006. A Reply Brief was filed on January 3, 2007.
30 The Appellant presented oral arguments at a hearing on February 20, 2008.

PRIOR ART

The Examiner relies upon the following prior art:

Gardner US 2002/0178034 A1 Nov. 28, 2002

Airline Tariff Publishing Company (ATPCO), ATPCO Construction Manual (May 22, 1995).

We also discuss the following prior art:

Jean-Paul Tremblay and Paul G. Sorenson (Tremblay), *An Introduction to Data Structures with Applications* 446-47 (Second Ed. 1984).

Gio Wiederhold (Wiederhold), *File Organization for Database Design* 192-193 and 220-221 (1987).

REJECTION

Claims 1-46 and 52-55 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO.

ISSUE

The issue pertinent to this appeal is whether the Appellant has sustained its burden of showing that the Examiner erred in rejecting claims 1-46 and 52-55 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO.

The pertinent issue turns on whether the art applied describes or suggests determining airline tariff variables during preprocessing and the use of hash tables in searching airline tariff variables.

FACTS PERTINENT TO THE ISSUES

The following enumerated Findings of Fact (FF) are believed to be supported by a preponderance of the evidence.

Facts Related to Claim Construction

01. A market is a city pair (Specification 1:4-5).
02. Published fares are stated prices for travel between two cities (Specification 1:5-8).
03. An arbitrary, like a published fare, lists two cities. However, unlike cities in a published fare (which establish a bidirectional market), the cities in an arbitrary are ordered: the first is the gateway (or major) city, and the second is the interior (or minor) city (Specification 1:23-28).
04. A gateway city is therefore synonymous with a major city.
05. An interior city is therefore synonymous with a minor city.

Facts Related to Appellant's Disclosure

06. For markets involving minor cities the airlines rely on a process called fare construction to produce fares that are sometimes called "constructed fares." Fare construction is particularly used for minor markets involving international travel (Specification 1:8-12).
07. The airline industry fare construction process provides a mechanism to extend a published fare with add-ons also called arbitraries, in order to derive prices to minor cities.
08. Constructed fares within the meaning of the airline industry can be either two-component constructed fares, i.e., one arbitrary combined with one published fare or three-component constructed fares, i.e., two arbitraries combined with one published fare (Specification 1:28-31).

09. In general, two-component constructed fares provide prices between a minor city and a major city, while three-component constructed fares provide prices between two minor cities (Specification 2:9-12).

10. One approach used to fare construction is to use a list of constructed fares called "The Unpublished Fares Product" that is available from Airline Tariff Publishing Company (ATPCO). ATPCO is an intermediary that maintains fares published by airlines and resellers. With "The Unpublished Fares Product" a cross-product of all arbitraries and all base fares is determined and provided into a list. That list can contain millions of constructed fares (Specification 2:13-20).

11. Current ATPCO rules permit one arbitrary and one base fare or two arbitraries and a base fare (Specification 12:29-30).

ATPCO

12. ATPCO is a manual directed to the use of ATPCO's service for airline fare construction.

13. A published fare is an amount published for use in pricing air transportation from one city to another city. Published fares price in fare quote systems (ATPCO 58).

14. An arbitrary is an amount published for use only in combination with other fares for the construction of through fares. It is also referred to as "proportional fare," "basing fare," and "add-on-fare." Arbitraries cannot be priced in fare quote systems

(ATPCO 58). Thus, arbitraries are not fares themselves, but are used to construct fares.

15. An unpublished fare is the combination of an add-on amount and a published fare amount resulting in an amount used in pricing air transportation from one city to another city. Unpublished fares are also referred to as "through fares," "constructed fares," and "behind point fares." Unpublished fares price in fare quote systems (ATPCO 58).

16. This is how unpublished fares are constructed:
add-on + published fare = unpublished fare
published fare + add-on = unpublished fare
add-on + published fare + add-on = unpublished fare (ATPCO 58).

17. For the fares in [FF 16] to be meaningful, the add-on and published fare must each have one city in common. That is, one cannot depart from a city other than the origin without having arrived in that city in a through-fare trip.

Gardner

18. Gardner is directed to reducing the costs and enhancing revenue controls associated with airline travel distribution. Gardner combines a sales transaction and a usage transaction into one centralized transaction. The system includes a bill per use module that combines each sales transaction with a corresponding usage transaction into one centralized transaction. Accordingly, each sales transaction represents a usage transaction. Thus, the bill per

use module eliminates the advanced issuance of an accountable and specific travel authorization (Gardner ¶ 0017-18).

19. Gardner computes prices using pricing services driver; coupled to: a fare component identification module; trip construction identification module; local fare retrieval module; joint fare retrieval module; footnote retrieval and validation module; market routings validation module; unpublished fare retrieval/validation; published rules retrieval/validation module; unpublished rule retrieval/validation module; and a tax driver module (Gardner ¶ 0095).

20. Fare component identification module identifies possible trip components within an itinerary by grouping the itinerary segments together in different ways to form possible fare components. The fare component identification module prevents illogical components from being generated (Gardner ¶ 0096).

21. Trip construction identification module identifies all possible combinations of trip constructions that, when combined, can be used to price all specified travel. This process will produce pricing entities, each describing a different combination of logical trip constructions that may produce the lowest ticket price (Gardner ¶ 0097).

22. For each component identified, pricing services driver typically will seek to determine the unpublished fare for the component by retrieving the agreements and calling unpublished footnote retrieval/validation module. After doing this, the unpublished fare

1 is retrieved using unpublished fare retrieval/validation module.
2 Next, the published routings retrieval/validation module is called.
3 Additionally, the process returns an array of unpublished fares
4 (Gardner ¶ 0098).

5 23. Pricing services driver can determine the published fares for the
6 components by calling retrieve local published fares module.
7 Retrieve local published fares module will retrieve published local
8 fares and add all qualifying round-trip and one-way fares to the
9 fares array (Gardner ¶ 0099).

10 24. By following these processes, the pricing services driver can
11 create a separate published and unpublished fares array for each
12 component within a pricing entity (Gardner ¶ 0101).

13 25. Pricing services driver performs published rules (Gardner ¶
14 0102).

15 26. Pricing services can determine the cheapest pricing entity based
16 on total published fare. This involves performing fares sorting
17 and the cheapest fare for each component is selected by filtering
18 through its fares array. It performs combinability validation at the
19 construction level, for each pricing entity (Gardner ¶ 0103).

20 27. Pricing services can determine if any unpublished agreements
21 correspond to the fares of the selected pricing entity. For each
22 component within the selected pricing entity, the process will
23 match the selected published fare with an unpublished fare. The
24 process will next perform a combinability validation within each
25 construction using the ticket designator as validation criteria. If

combinability is passed, the process will call unpublished fare retrieval/validation module to retrieve and validate the unpublished rules. FIG. 7b illustrates the processing flow of pricing services driver (Gardner ¶ 0104).

Facts Related To The Level Of Skill In The Art

28. Neither the Examiner nor the Appellant has addressed the level of ordinary skill in the pertinent arts of tracking items and data formatting. We will therefore consider the cited prior art as representative of the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“[T]he absence of specific findings on the level of skill in the art does not give rise to reversible error ‘where the prior art itself reflects an appropriate level and a need for testimony is not shown’”) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

Facts Related To Secondary Considerations

29. There is no evidence on record of secondary considerations of non-obviousness for our consideration.

PRINCIPLES OF LAW

Claim Construction

During examination of a patent application, pending claims are given their broadest reasonable construction consistent with the specification. *In re Prater*, 415 F.2d 1393, 1404-05 (CCPA 1969); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

1 Limitations appearing in the specification but not recited in the claim
2 are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d
3 1364, 1369 (Fed. Cir. 2003) (claims must be interpreted “in view of the
4 specification” without importing limitations from the specification into the
5 claims unnecessarily).

6 Although a patent applicant is entitled to be his or her own
7 lexicographer of patent claim terms, in *ex parte* prosecution it must be
8 within limits. *In re Corr*, 347 F.2d 578, 580 (CCPA 1965). The applicant
9 must do so by placing such definitions in the Specification with sufficient
10 clarity to provide a person of ordinary skill in the art with clear and precise
11 notice of the meaning that is to be construed. *See also In re Paulsen*, 30
12 F.3d 1475, 1480 (Fed. Cir. 1994) (although an inventor is free to define the
13 specific terms used to describe the invention, this must be done with
14 reasonable clarity, deliberateness, and precision; where an inventor chooses
15 to give terms uncommon meanings, the inventor must set out any
16 uncommon definition in some manner within the patent disclosure so as to
17 give one of ordinary skill in the art notice of the change).

18 *Obviousness*

19 A claimed invention is unpatentable if the differences between it and
20 the prior art are “such that the subject matter as a whole would have been
21 obvious at the time the invention was made to a person having ordinary skill
22 in the art.” 35 U.S.C. § 103(a) (2000); *KSR Int’l v. Teleflex Inc.*, 127 S.Ct.
23 1727, 1729-30 (2007); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14
24 (1966).

25 In *Graham*, the Court held that that the obviousness analysis is
26 bottomed on several basic factual inquiries: “[1)] the scope and content of

the prior art are to be determined; [(2)] differences between the prior art and the claims at issue are to be ascertained; and [(3)] the level of ordinary skill in the pertinent art resolved.” 383 U.S. at 17. *See also KSR Int’l v. Teleflex Inc.*, 127 S.Ct. at 1734. “The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, at 1739.

“When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one. If a person of ordinary skill in the art can implement a predictable variation, § 103 likely bars its patentability.” *Id.* at 1740.

“For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.*

“Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 1742.

ANALYSIS

Claims 1-46 and 52-55 rejected under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO.

Claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34

The Appellant argues claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34 as a group.

Accordingly, we select claim 1 as representative of the group.
37 C.F.R. § 41.37(c)(1)(vii) (2007).

1 The Examiner found that Gardner described the limitations of claim 1
2 except for arbitraries and found that ATPCO described the use of arbitraries
3 to construct the unpublished fares of Gardner. The Examiner implicitly
4 found that one of ordinary skill would have used the air fare construction
5 method of ATPCO to provide improved passenger service and concluded
6 that it would have been obvious to a person of ordinary skill in the art to
7 have applied ATPCO's use of arbitraries and air fare construction to Gardner
8 (Answer 3-5).

9 The Appellant contends that none of the art applied, nor the
10 background in the Specification, describes the preprocessing limitation in
11 claim 1 (Appeal Br. 12:Last full ¶). The Appellant argues that Gardner does
12 not describe fare construction, but merely the accessing of published and
13 unpublished fares (Appeal Br. 13:Second to last ¶). As a result, the
14 Appellant concludes that Gardner's fare components are not directed to the
15 use of arbitraries (Appeal Br. 15:Top ¶). The Appellant further argues that
16 Gardner's published fares do not include travel between gateway and minor
17 cities, because if it did, there would be no need for ATPCO's fare
18 construction (Appeal Br. 13:Last ¶ - 14:First ¶ following the ATPCO
19 extract). The Appellant contends that any combination of APTCO and
20 Gardner would result in a simple cross product of all published fares and
21 arbitraries (Appeal Br. 14:Third from bottom ¶). The Appellant finally
22 argues that Gardner would not incorporate ATPCO's fare construction
23 because Gardner fails to describe any of ATPCO's features (Appeal Br.
24 15:Bottom ¶ - 16:Second ¶).

25 We disagree. Gardner describes the storage of unpublished fares [FF
26 22]. Unpublished fares, by definition, are unpublished. They must be

constructed as the combination of an add-on amount and a published fare amount resulting in an amount used in pricing air transportation from one city to another city [FF 15]. Therefore, some preprocessing necessarily occurred in Gardner to create unpublished fares. Whether the preprocessing was performed directly in Gardner's system or indirectly by Gardner relying on ATPCO's fare construction is not pertinent to whether their combination described the limitations of claim 1. Thus, in turn, whether Gardner's fares include arbitraries *per se* is equally irrelevant to the question of whether arbitraries were used in the construction of Gardner's unpublished fares.

An add-on fare is an arbitrary [FF 14]. An unpublished fare is the combination of an add-on amount and a published fare [FF 15]. Thus, every unpublished fare stored in Gardner was constructed by the process of step [3] in claim 1. So now the issue becomes whether steps [1] and [2] were predictable to one of ordinary skill in constructing these published fares.

ATPCO describes a constructed fare as being the sum of a published fare and an arbitrary [FF 16]. Published fares are fares between cities [FF 02]. However, because travel relying on an arbitrary requires that one of the cities in the arbitrary be a gateway city [FF 03], at least one of the cities in each published fare used to create an unpublished fare must be a gateway city. So now we have established that the preprocessing necessarily performed by Gardner must have determined an arbitrary and a published fare that could be added to the arbitrary to create an unpublished fare. Since an arbitrary is an ordered set of a gateway and interior city [FF 03], determining an arbitrary necessarily determines the interior city that appears with the gateway city in an arbitrary for an airline. Thus we establish that

the preprocessing to create Gardner's unpublished fare list must have included step [1] of claim 1.

So now the remaining issue is whether one would have searched for a gateway city corresponding to a given arbitrary to look up a published fare. Again, an unpublished fare is the sum of an arbitrary and a published fare [FF 16] and one gateway city must be common between the arbitrary and published fare [FF 17]. Having determined the interior and one gateway city from the arbitrary, it is required that the published fare include the same gateway city as in the arbitrary. The only way to ensure this is by restricting the domain of published fares to those having this gateway. So now the only issue is whether the published fares are searched.

The Appellant argues, *supra*, that searching is not required because the fares may be determined by a cross product. But this merely glosses over the simple fact that a cross product computation itself requires a search for the operands of each term in the cross product. The fact that a given arbitrary may only be combined with a subset of published fares necessarily requires searching among the published fares for those that may be combined. The Appellant argues that there are no teachings of constructing a database of gateways based on interior cities appearing in arbitraries (Reply Br. 4:Second ¶). We find this argument is not commensurate with the scope of the claim. Claim 1 only requires that a data base is searched for gateway cities corresponding to determined interior cities appearing in arbitraries. This limitation says nothing regarding how such a database is constructed. However, the requirement for a published fare for a gateway city matching the gateway city in the now determined arbitrary necessitates that the database having such a fare exist.

Further, we find that whether a search occurs in a cross product computation or a more direct computation does not negate this basic requirement. The Appellant makes no contention that a cross product computation would not involve such a search, but merely contends that a cross product would compute millions of fares (Appeal Br. 10:Last full ¶). Thus, we conclude that step [2] of claim 1 is performed in the preprocessing to create Gardner's unpublished fares table.

We therefore find that all three steps of claim 1 are necessarily performed by the combination of Gardner and ATPCO, and the Appellant has not sustained its burden of showing error in the Examiner's rejection of claims 1, 7, 8, 10, 13, 22, 28, 30, 31, and 34.

Claims 2-6, 21, 23-27, and 42

The Appellant argues claims 2 and 23 as a group; 3 and 24 as a group; 4-6 and 25-27 as a group; and 21 and 42 as a group. Accordingly, we select claims 2, 3, 4, and 21 as representatives of these groups.

Claim 2 further requires accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.

The Examiner found that Gardner described this (Answer 7). The Appellant contends that neither Gardner nor ATPCO describe either a hash table or the required indexes (Appeal Br. 7-8). The Examiner responds that the only requirement of claim 2 is that a table is accessed (Answer 24). The Examiner further found that Gardner's searching of databases disclosed a hash table (Answer 24). The Appellant responds in turn that claim 2 requires both a hash table and certain indexes (Reply Br. 6-7).

1 We agree. It is unclear why the Examiner found that the index and
2 hash table limitations of claim 2 were not required limitations, or why
3 simply searching a database described use of a hash table. However, the use
4 of both indexes and hash tables are step limitations in method claim 2, and
5 the Examiner has erred by not providing prima facie evidence that these
6 limitations are described or suggested by either Gardner or ATPCO. Claims
7 3, 4, and 21 have similar limitations and we therefore find the Examiner has
8 erred with claims 2-6, 21, 23-27, and 42.

9 *Claims 9, 11, 12, 14-20, 29, 32, 33, 35-41, and 43-46*

10 The Appellant argues claims 9 and 29 as a group; 11 and 32 as a
11 group; 12 and 33 as a group; 14, 15, 19, 35, 36, 40, and 43-46 as a group; 16
12 and 37 as a group; 17, 18, 38 and 39 as a group; and 20 and 41 as a group.
13 Accordingly, we select claims 9, 11, 12, 14, 16, 17, and 20 as representatives
14 of these groups.

15 Claim 9 further requires determining if an entry in a construction table
16 was memorized before accessing the construction table; and if the entry was
17 memorized, retrieving an answer from a store of memorized entries. The
18 Examiner found that Gardner described this requirement (Answer 9). The
19 Appellant contends that Gardner does not describe a memorization
20 procedure (Appeal Br. 18:Third ¶). We find this argument is not
21 commensurate with the scope of claim 9, which recites no limitation of
22 memorizing, but merely determining whether an entry was memorized.
23 Since all of the data in Gardner's databases [FF 19] are in memory, all such
24 data are determined to have been memorized and are accessed accordingly.

1 Claim 11 further requires determining a second set of interior cities
2 that appear with a second gateway city in the published fare for the airline
3 and applying an arbitrary that extends the published fare to a city from the
4 second set of interior cities to produce a three component constructed fare.
5 The Examiner found that Gardner described this requirement (Answer 9).
6 The Appellant admits that its admitted prior art and ATPCO clearly disclose
7 extending a published fare with an arbitrary (Appeal Br. 19:First full ¶), but
8 contends that neither reference describes determining a second set of interior
9 cities (*id*). We disagree. Since, as the Appellant admits, ATPCO discloses
10 extending a published fare with a second arbitrary [FF 16], that second
11 arbitrary is necessarily determined. In turn, the definition of an arbitrary as
12 an ordered set of a gateway and interior city [FF 03], implies that the
13 determination of an arbitrary thus determines a second set of interior cities
14 that appear with a second gateway city in the published fare for an airline.

15 Claim 12 further performed claim 1 over all determined cities; claim
16 14 applied claim 1 to international fares in its preamble; claim 16 is
17 essentially similar to claim 11; claim 17 essentially combines claims 11 and
18 12; and claim 20 is essentially similar to claim 9. The Examiner found that
19 Gardner and ATPCI described these requirements (Answer 3-9). The
20 Appellant admits that the prior art would publish a list of constructed fares
21 (Appeal Br. 19:Third full ¶), but contends that neither reference would apply
22 this to a determined second set of interior cities (*id*); and that the prior art
23 does not produce international fares (Appeal Br. 20:First ¶). We disagree.
24 Since, as the Appellant admits the prior art would publish a list of all
25 constructed fares [FF 19 & 22], that list necessarily includes all determined
26 cities and includes international fares. As to those claims incorporating

features of claims 9 and 11, we make the same findings as we did with claims 9 and 11, *supra*.

We therefore find the Appellant has failed to sustain its burden of showing the Examiner erred in rejecting claims 9, 11, 12, 14-20, 29, 32, 33, 35-41, and 43-46.

Claims 52-55

The Appellant argues claims 52, 53, and 55 as a group. Accordingly, we select claim 52 as representative of this group.

Claim 52 is essentially similar to claim 2. The Examiner found that Gardner and ATPCO described the limitations of claim 52 (Answer 5-7). The Appellant contends that neither reference describes these limitations for the same reasons as in claim 2, and we agree that the references do not describe these limitations, or those of separately argued claim 54, also depending from claim 52, for the same reasons, *supra*.

CONCLUSIONS OF LAW

The Appellant has not sustained its burden of showing that the Examiner erred in rejecting claims 1, 7-20, 22, and 28-41, but has sustained its burden of showing that the Examiner erred in rejecting claims 2-6, 21, 23-27, 42, and 52-55 under 35 U.S.C. § 103(a) as unpatentable over the prior art.

NEW GROUND OF REJECTION

The following new ground of rejection is entered pursuant to 37 C.F.R. § 41.50(b).

Claims 2-6, 21, 23-27, 42, and 52-55 are rejected under 35 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the admitted prior art, Tremblay, and Wiederhold. We found that Gardner and ATPCO described all of the limitations of these claims, except for searching for cities indexed by those cities using a hash table, *supra*. Those of ordinary skill knew that using such indexes and a hash table would have improved performance for constructing the fares in Garner and ATPCO, as evidenced by Tremblay and Wiederhold.

ADDITIONAL FACTS PERTINENT TO THE ISSUES

The following additional enumerated Findings of Fact (FF) are believed to be supported by a preponderance of the evidence.

Tremblay

30. Tremblay is a treatise of data structures used for computer programs and accordingly documents portions of what those of ordinary skill in the programming arts knew regarding how to represent the problems they were trying to solve with data structures appropriate to the problem.

31. Tremblay describes one data representation that is conceptually simple for representing a graph. This representation is an *edge list* and is a list of each pair of nodes connected by an edge in a graph. In addition to its simplicity, one of ordinary skill knew that an edge list also has the advantage that since it contains only data relating to actual edges in a graph, processing with an edge list avoids processing of vertex pairs unconnected by edges. If the graph is a digraph, i.e., a graph where each edge has a direction,

then each directed edge is stored with the origin being the first of the two nodes. This list may be stored as a linked list, in which case each end node would have a link pointing to it, i.e., would be indexed. Further fields could be added about each edge (Tremblay 446).

Wiederhold

32. Wiederhold is a treatise of methods for storing data in files used for computer programs and accordingly documents portions of what those of ordinary skill in the programming arts knew regarding how to store data for the problems they were trying to solve with data structures appropriate to the problem.

33. Wiederhold describes the use of hashed files. Hashed files have been used since the earliest disk files. Hash files find frequent use in pricing tables, schedules and name lists, among other uses (Wiederhold 192:¶ 6-1-6).

34. The outstanding feature of hashed files is that records can be accessed in constant time (Wiederhold 220:¶ 65).

First we find that because an airline fare data structure is essentially the same as an airline route structure, but with fares instead of distance, and because an airline route structure is a graph having a node for each origin and destination and an edge for each flight between each source and destination pair, the structure for airline fares used by Gardner and ATPCO are those of graphs. An effective data structure for representing such a graph is an edge list, which is indexed by each origin city [FF 31]. Each edge represents a particular flight and therefore a particular airline. Thus

each entry in the edge list would be indexed by the airline and the origin city.

Next we find that a hash table is one of the oldest data structures used for disk files and is known to be appropriate for pricing and schedules [FF 33]. A hash table is accessed in constant time [FF 34].

Thus, one of ordinary skill would have searched pricing and flight schedules by Gardner and ATPCO using hash tables and indexes on airline and origin. The origin would have been an interior city for a flight starting in an interior city (claims 2, 5, 21, 23, 25, 26, 42, 52, 53, 54, and 55) and gateway for a flight connecting to a flight from an interior city (claims 4, 5, 21, 25, 42, 54, and 55). The search would have been performed in constant time (claims 3, 6, 24, and 27).

DECISION

To summarize, our decision is as follows:

- The rejection of claims 1, 7-20, 22, and 28-41 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO is sustained.
- The rejection of claims 2-6, 21, 23-27, 42, and 52-55 under 35 U.S.C. § 103(a) as unpatentable over Gardner, Admitted Prior Art, and ATPCO is not sustained.
- The following new grounds of rejection is entered pursuant to 37 C.F.R. § 41.50(b).

1 o Claims 2-6, 21, 23-27, 42, and 52-55 are rejected under 35
2 U.S.C. § 103(a) as unpatentable over Gardner, ATPCO, the
3 admitted prior art, Tremblay, and Wiederhold.

4 Regarding the affirmed rejection(s), 37 C.F.R. § 41.52(a)(1) provides
5 "Appellant may file a single request for rehearing within two months from
6 the date of the original decision of the Board."

7 In addition to affirming the Examiner's rejection(s) of one or more
8 claims, this decision contains new grounds of rejection pursuant to 37 C.F.R.
9 § 41.50(b). 37 C.F.R. § 41.50(b) provides "[a] new ground of rejection
10 pursuant to this paragraph shall not be considered final for judicial review."

11 37 C.F.R. § 41.50(b) also provides that the Appellant, WITHIN TWO
12 MONTHS FROM THE DATE OF THE DECISION, must exercise one of
13 the following two options with respect to the new ground of rejection to
14 avoid termination of the appeal as to the rejected claims:

15 (1) Reopen prosecution. Submit an appropriate amendment of
16 the claims so rejected or new evidence relating to the claims so
17 rejected, or both, and have the matter reconsidered by the examiner, in
18 which event the proceeding will be remanded to the examiner

19 (2) Request rehearing. Request that the proceeding be reheard
20 under § 41.52 by the Board upon the same record

21

22 Should the Appellant elect to prosecute further before the Examiner
23 pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek
24 review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection,
25 the effective date of the affirmance is deferred until conclusion of the
26 prosecution before the examiner unless, as a mere incident to the limited
27 prosecution, the affirmed rejection is overcome.

1 If the Appellant elects prosecution before the examiner and this does
2 not result in allowance of the application, abandonment or a second appeal,
3 this case should be returned to the Board of Patent Appeals and Interferences
4 for final action on the affirmed rejection, including any timely request for
5 rehearing thereof. No time period for taking any subsequent action in
6 connection with this appeal may be extended under 37 C.F.R. §
7 1.136(a)(1)(iv) (2007).

8 AFFIRMED-IN-PART; 37 CFR § 41.50(b)

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